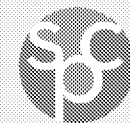

Multi Material Flexible Recovery Collaborative

September 22, 2020

Co chairs:

Ashley Leidolf, Dow

Sridevi Narayan-Sarathy, PepsiCo



**SUSTAINABLE PACKAGING
COALITION®**

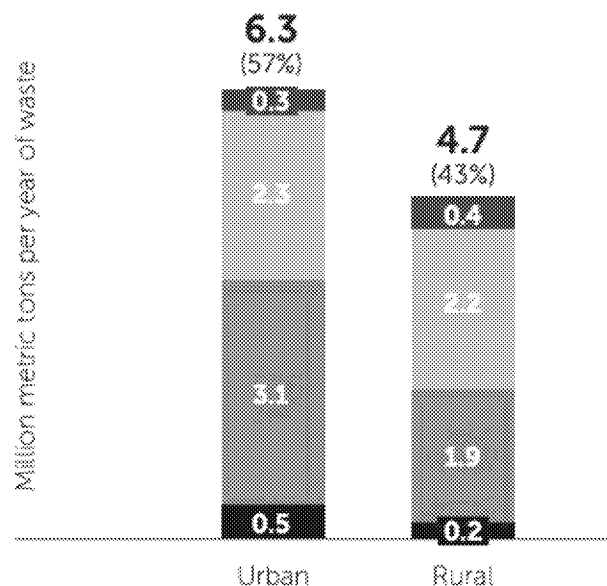
Agenda

1. Welcome and updates
2. Next steps for MMFR Collaborative
3. Sharing SPC's research agenda

Figure 6: Main leakage points by geographic archetype and plastic category, 2016

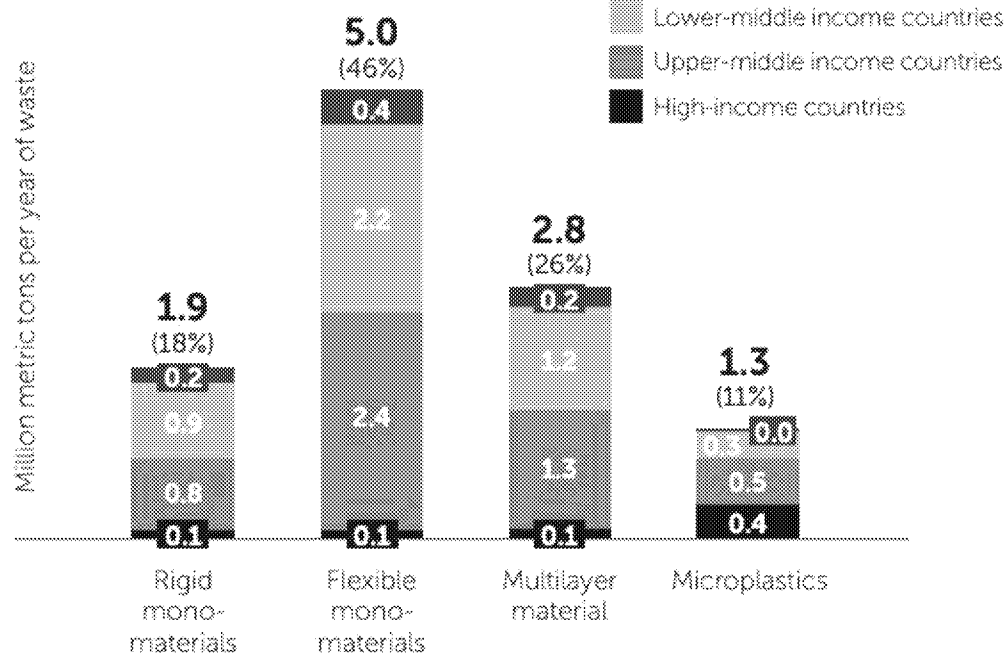
Flexible monomaterials and multilayer materials have a disproportionate share of leakage

Plastic leakage in 2016 by geographic type



Share of plastic production that leaks

Plastic leakage in 2016 by category



Defines chemical recycling as highly applicable to flexibles

Figure 14: System interventions relevance by geographic archetype and plastic category
System interventions need to be applied to the regions and plastic categories for which they are most relevant

		Highly applicable						Somewhat applicable				Not applicable	
System intervention		Most relevant income groups				Urban/rural		Most relevant plastic categories				Main responsible stakeholder	
		HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics		
1	Reduce growth in plastic consumption	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Consumer goods brands; retailers	
2	Substitute plastics with suitable alternative materials	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Consumer goods brands; retailers	
3	Design products and packaging for recycling	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Consumer goods brands	
4	Expand waste collection rates in the Global South	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Local governments	
5	Increase mechanical recycling capacity globally	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Waste management companies	
6	Scale up global capacity of chemical conversion	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	Waste management companies; petrochemical industry	
7	Build safe waste disposal facilities	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	National governments	
8	Reduce plastic waste exports	HI	UMI	LMI	LI	U	R	Rigid	Flex	Multi	Microplastics	National governments	

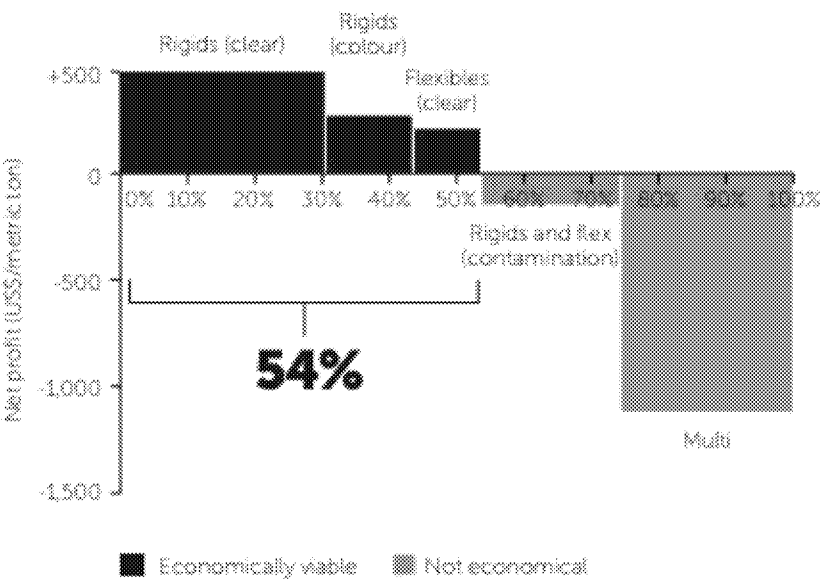
HI: High-income LMI: Lower middle-income UMI: Upper middle-income LI: Low-income

There is a role for both mechanical and chemical recycling

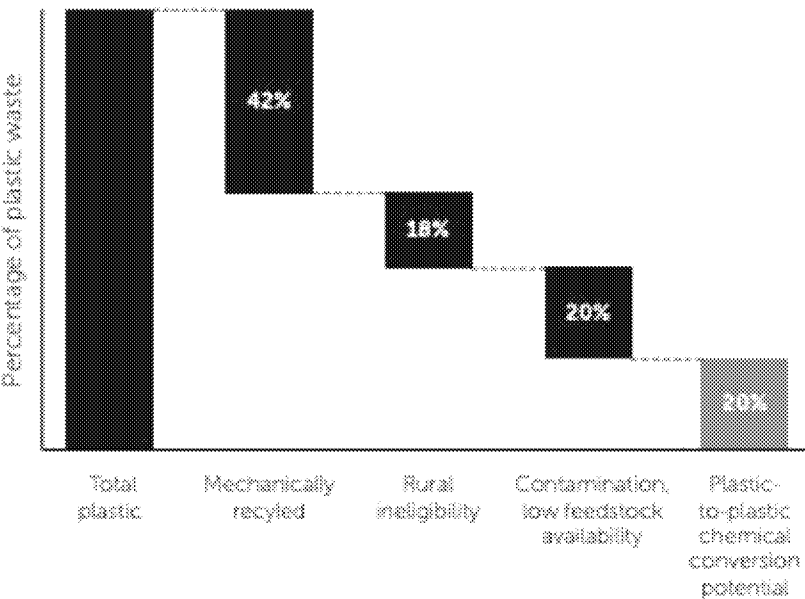
Figure 11: Limitations of mechanical recycling and plastic-to-plastic chemical conversion

By 2040, mechanical recycling could deal with 54 per cent of the plastic waste stream economically while plastic-to-plastic chemical conversion could deal with 20 per cent

1. Financial feasibility of mechanical recycling, high-income (HI) countries only, 2040



2. Plastic waste feasible for plastic-to-plastic chemical conversion, 2040



New website launched!

<https://collaboratives.sustainablepackaging.org/multi-material-flexible-packaging-recovery>

Become a Member

Table of Contents

Overview of Multi-Material Flexible Packaging (MMFP)

Mapping Challenges for MMFP Across the Recovery System

Exploring Initiatives to Increase MMFP Recovery

Our Projects

Our Findings

Design for Recovery Insights

Collection Findings

Sortation Findings

Processing and End Markets

FAQs and Additional Resources

Participating Members

Multi-Material Flexible Packaging Recovery Collaborative

This Collaborative studies sustainable end-of-life solutions for multi-laminate flexible packaging.

Contact

tristanne.davis@greenblue.org

SPC Team Lead

Tristanne Davis, Senior Manager

Co-Chairs

Ashley Elwell, Dow Chemical

Shrdevi Narayan Sarathy, PepsiCo

This Collaborative's mission is to provide resources for companies that want to learn more about multi-material flexible packaging recovery and define key actions that can be taken to improve the end-of-life options of multi-material flexible packaging.

Are you a current SPC member who wants to join the Collaborative?

Email tristanne.davis@greenblue.org

Not an SPC member yet?

Become a member by applying today!

Become a Member

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graph LR; Energy[Energy] --> Feedstock[Feedstock]; Feedstock --> Monomer[Monomer]; Monomer --> Polymer[Polymer]; Polymer --> Energy; Polymer --> Feedstock; Polymer --> Monomer
```

Energy
Energy Recovery
Thermal conversion that produces fuel for energy

Feedstock
Feedstock Recycling
Thermal conversion, e.g. pyrolysis, gasification that produces hydrocarbon intermediates

Monomer
Monomer Recycling
Chemical decomposition that produces monomers, i.e. hydrolysis

Polymer
Polymer Recycling
Mechanical recycling with chemical purification that produces polymers e.g. solvolysis

```
graph LR; NR[Natural Resources] --> PM[Polymer Manufacturer]; PM --> PC[Plastics Converter]; PC --> UC[User/Consumer]; UC --> NR; UC --> PM; UC --> PC
```

Natural Resources
Composting, Feedstock Recovery

Polymer Manufacturer
Feedstock Recycling

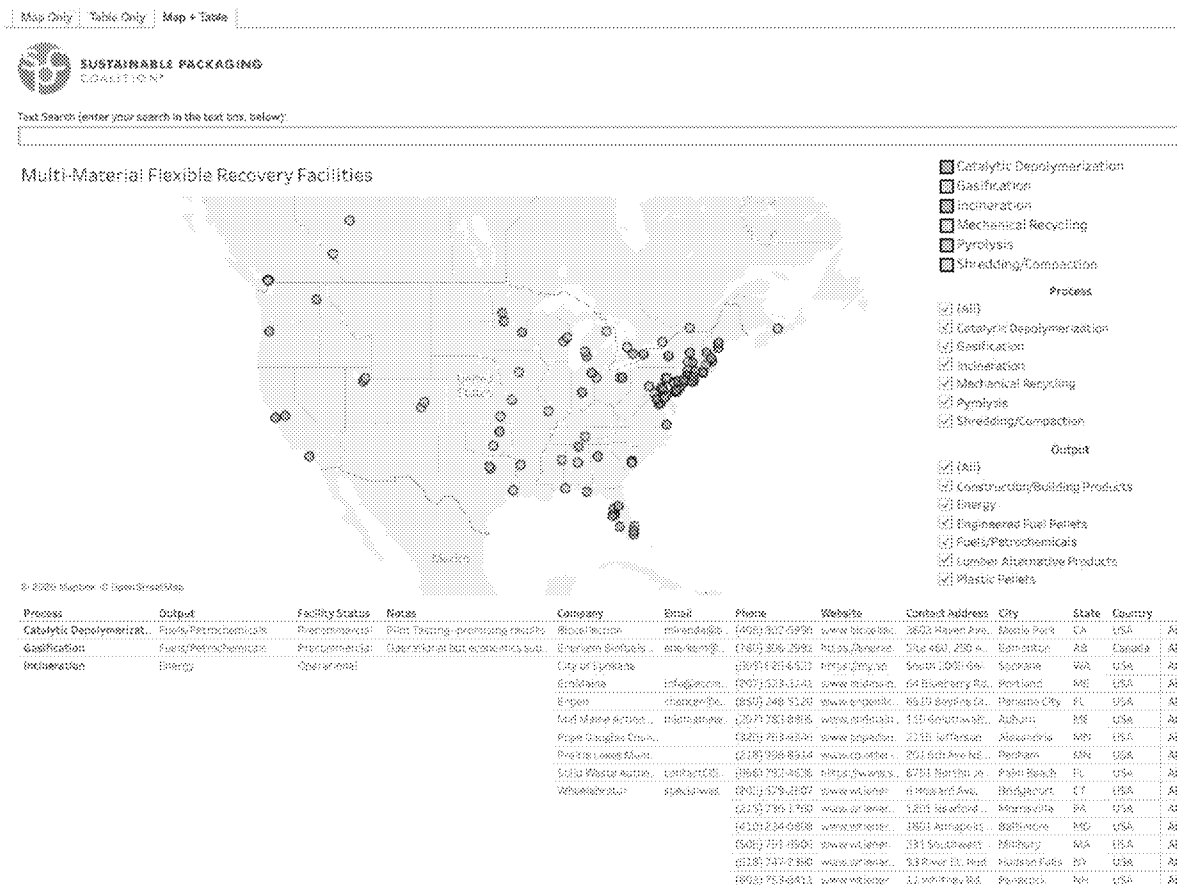
Plastics Converter
Polymer Recycling

User/Consumer
Reuse

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Next steps for MMFR Collaborative

- Update Technology recovery map - and build on this further



Next steps for MMFR Collaborative

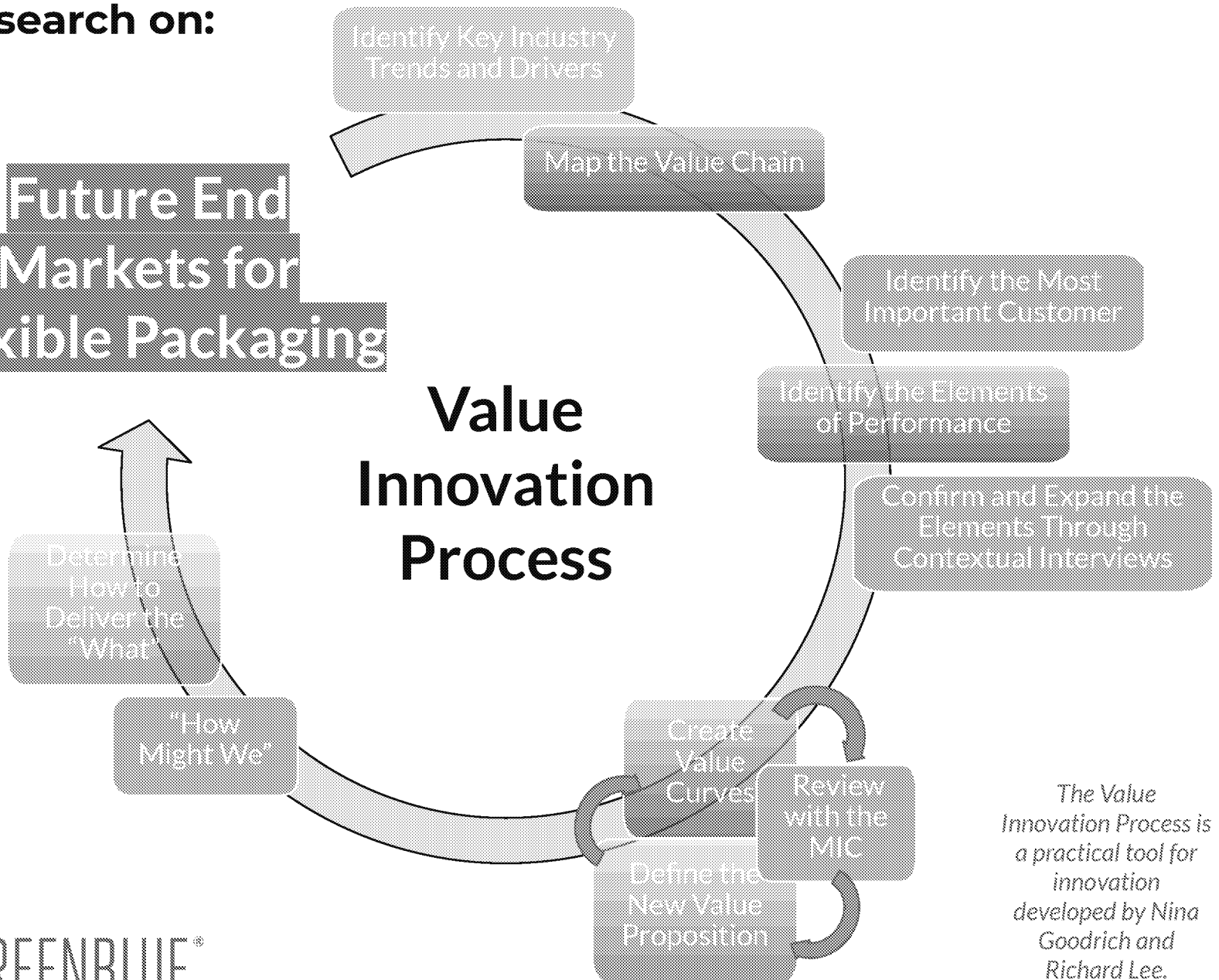
- We discussed 'design for chemical recycling' guidelines on our last call. Some back work needed before this is possible.
- This group can expand our focus on 'technologies mapping' - building off of our past work. **Develop a matrix tool reviewing each technology including key info like yield, LCA impacts and which markets technologies lead to. Create a recovery hierarchy by resins/formats based on this info.**
- Design guidance and other projects may emerge from this once the flexibles landscape is fully understood.
- Scale is needed for these technologies - you can't look at MMF in isolation! **Broaden the focus of this group to all flexible packaging.**

	PE film	PLA film	PE/PET
Feedstock recycling - Pyrolysis	x Yield LCA	NA	x Yield LCA
Monomer recycling - Decomposition	NA	x Yield LCA	NA
Polymer recycling - Mechanical	x Yield LCA		Only with solvolysis add-on Yield LCA

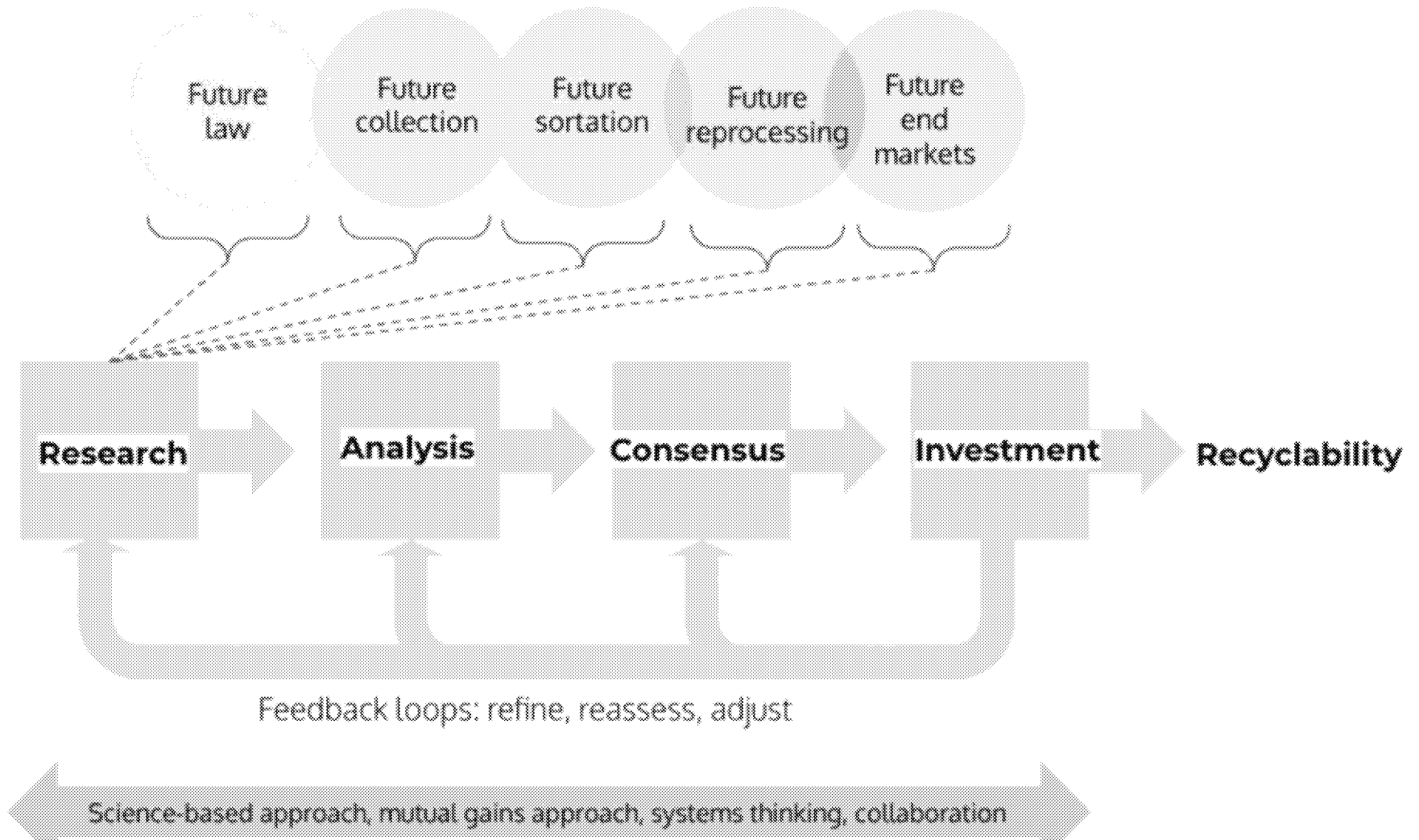
SPC research on:

Future End Markets for Flexible Packaging

Value Innovation Process



The Value Innovation Process is a practical tool for innovation developed by Nina Goodrich and Richard Lee.



The essential questions...

- End markets for recycled plastics are mostly in durables and non food grade packaging. Limited demand for material currently on the market drives low recovery and downcycling.
- Limited supply of quality PCR means can't use much in packaging at scale.
- Can new emerging technologies like chemical recycling change this? What collection systems will feed these technologies? How will packaging need to be designed to benefit from these technologies?

Summary of 'How to Deliver the What' - new SPC research (in development)

Conduct new research project - start Q4 2020	Create a recovery technologies tool - start Q4 2020	Evolution to future steps - start date TBD 2021
<p>Provide visibility to the flexible pkg stream (industry, commercial and consumer):</p> <ol style="list-style-type: none">1) Amounts, composition2) Collection systems3) Markets, including yield differences for different markets. <ul style="list-style-type: none">- Initial focus on films but make link to all olefins.- Establish that household level is a small piece.- Scale and critical mass is needed for chemical recycling. What is the pathway to achieve that?- Build off of Pew and WM study.- Collaborate with FPA and RILA.	<p>List out all of the technologies for film recovery (mechanical and chemical) and review each:</p> <ul style="list-style-type: none">- Include screening criteria like LCAs, yield- Allow users to search by 'pyrolysis' etc.- Have hierarchy by resins/formats.- Use categories defined in MMFR group and build on this.- Build off of CLP work.- Good project for MMFR Collaborative → <i>The Flexible Packaging Recovery Collaborative</i>.	<p>The solution may be more apparent once we know where the materials are (research project) and what the technologies are (technologies tool). Once we complete these projects, there will likely be future projects. Some possibilities:</p> <ul style="list-style-type: none">- Design guidance for different polymer families/barrier combos that feed different chemical and mechanical technologies and fit into different collection pathways.- Thought leadership establishing a hierarchy of end markets and pathways for the future of flexibles/olefins recovery and beyond.

Stay tuned!

We will be in touch soon with next steps.